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Finger Mouse Movement

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ABSTRACT

As we know, for every electronic device, we need to perform some actions to control them. In our project, we represent a novel approach for better human computer interaction (HCI) where we are using finger tips using real-time camera in order to overcome the drawbacks of existing methods and make the system cheaper and more user friendly. Our project proposes a real-time fingertip tracking technique using a web camera to enable users to remotely control their computer mouse by their own bare hands. Our method is to use a camera and computer vision technology, such as image segmentation and compression, to control mouse tasks. Finger tips are acquired using web camera. The hand region is firstly extracted by background subtraction and filtered by the morphological opening operations and blob labelling. Then, convex hull and convexity defect are used to count the fingers and detect the coordinates of the fingertip. Through web camera the real time video is captured. After that image processing is performed on each frame of that video in order to detect the finger tip. And accordingly particular actions are performed on the screen.

Keywords-- Segmentation, Finger detection, Denoise, Image resize, Fingertip

I. INTRODUCTION

The project is on the **"Finger Mouse Movement"**. Today Human Computer Interaction is an interface with which we can virtually interact with the systems with an ease. Here we are trying to perform the operations of mouse using hand gesture recognition. The main objective of our project is to presents a vision based application for virtual mouse interface using Finger-Tiptop using a camera as an input interface to the computer.

Interactive presentation systems use advanced Human Computer Interaction (HCI) techniques to provide a more convenient and user-friendly interface for controlling presentation displays, such as page up/down controls in a slideshow. Compared with traditional mouse and keyboard control, the presentation experience is significantly improved with these techniques.

As computer technology continues to develop, people have smaller and smaller electronic devices and want to use them ubiquitously. There is a need for new interfaces designed specifically for use with these smaller devices. Increasingly we are recognizing the importance of human computing interaction (HCI), and in particular vision-based gesture and object recognition. Simple interfaces already exist, such as embedded keyboard, folder-keyboard and mini-keyboard. However, these interfaces need some amount of space to use and cannot be used while moving. Touch screens are also a good control interface and nowadays it is used globally in many applications. However, touch screens cannot be applied to desktop systems because of cost and other hardware limitations. By applying vision technology and controlling the mouse by natural hand gestures, we can reduce the work space required. In this paper, we propose a novel approach that uses a video device to control the mouse system. This mouse system can control all mouse tasks, such as clicking (right and left), double clicking and scrolling. We employ several image processing algorithms to implement this

II. BACKGROUND

The project mainly aims at mouse cursor movements and click events based on finger-tip detection technique. It is a cost effective real time working system.

By applying vision technology and controlling the mouse by fingertip on virtual panel we can achieve accurate and effective interaction with computer even at larger distances away from camera. An intensity based approach is used to detect the arbitrary shaped, uniform colored 2D area on which the hand operates, and then the fingertip is effectively detected and tracked using the sampled hand contour. Grid sampling approach is used for a fast implementation. The system achieves speeds of up to 30 fps tip pointers such as a stylus or a pen can be used in place of the fingertip, making the device user-friendly.

III. METHOD AND EQUATIONS

3.1 Image Resize

First to recognize a hand gesture, we need to resize the input image in order to map camera coordinates to screen coordinates. There are two ways to map from source image to destination image.

3.2 Segmentation

Next, we need to separate the hand area from a complex background. It is difficult to detect skin color in natural environments because of the variety of illuminations and skin colors. So, we need to carefully pick a color range. Segmentation

3.3 Deleting noise

Using this approach, we cannot get a good estimate of the hand image because of background noise. To get a better estimate of the hand, we need to delete noisy pixels from the image. We use an image morphology algorithm that performs image erosion and image dilation to eliminate noise Erosion trims down the image area where the hand is not present and Dilation expands the area of the Image pixels which are not eroded.

3.4 Moving Mouse Cursor

We used the index finger as a cursor controller to control mouse cursor. We used two different approaches for moving the mouse cursor. The first method is mapping cursor control. It means that the index finger on a camera screen can position maps to a desktop screen position. In other words, the mouse cursor is placed on the desktop window along with the index finger tips position displayed on the camera screen position.

Next, we move the mouse cursor if the gap between the two finger images (current and previous frame) is far then the mouse cursor moves fast or, if the gap is close then the cursor moves slow.

3.5 Left Clicking and Double-Clicking

To call system event for left clicking, at least two convex hull vertexes have to be off the palm area which was computed in the previous part. In addition, the x position of one of two vertexes should be lower than the other to restrict detection of other finger tips. When the degree of the index finger and thumb is 70 to 90 degree then we can recognize that the gesture is left clicking. Actually, if the thumb is placed outside the circle of the hand region, then the gesture is left clicking. The double-clicking occurs when the thumb moves 0 to 90 degree and back two times fast.

3.6 Right Clicking

We simply implemented this part using previous gestures. If we make the hand pose left clicking for 3 seconds, then the system calls the right clicking event.

IV. FIGURES AND TABLES

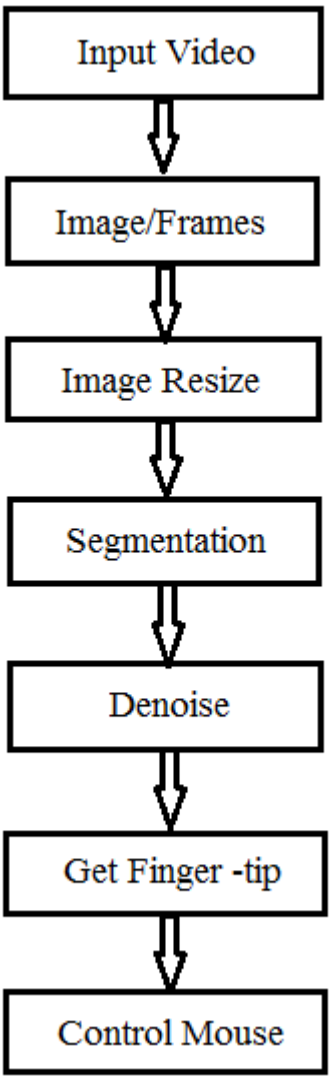

Fig. 1: An overview of our Fingertip recognition and mouse control system

V. CONCLUSION

We developed a system to control the mouse cursor using a real-time camera. We implemented all mouse tasks such as left and right clicking, double clicking, and scrolling. This system is based on computer

vision algorithms and can do all mouse tasks. However, it is difficult to get stable results because of the variety of lighting and fingertip of human races. Most vision algorithms have illumination issues. From the results, we can expect that if the vision algorithms can work in all environments then our system will work more efficiently. This system could be useful in presentations and to reduce work space. In the future, we plan to add more features such as enlarging and shrinking windows, closing window, etc. by using the palm and multiple fingers.

VI. FUTURE WORK

The earlier system were used to identify the hand gestures for opening and closing of the particular application so instead of that the mouse movement is done by using the 3 fingers of the hand .The earlier system were using hand gesture and it is difficult for new user to become well known to the hand gestures. So to overcome this problem we are developing this system.

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